

Getting to the Root: Solving a Multi-Instrument Mystery at a 12 Tank Production Facility

Omni was approached by a process engineer we'd previously worked with to investigate several challenges at a production facility under their management. The facility operated twelve 7,000-gallon process tanks, each equipped with double agitators, load cells, level transmitters, and temperature transmitters. The tanks handled a range of functions including mixing, heating, pasteurizing, storing, and transferring various liquid products, and the process engineer had been tasked with streamlining operations to improve overall product quality and throughput.

The trouble centered on the level transmitters, which were intermittently providing false readings or failing to function altogether. Compounding the issue, load cells were frequently indicating full tanks while the associated level transmitters read empty, a conflict that made reliable process control impossible. Omni dispatched a senior technician to examine the system and review batch trends from previous months, and it quickly became clear that the level transmitters were the source of the problem.

We contacted the manufacturer's application engineer, who recommended calibration, various tuning procedures, and additional testing. Despite following those guidelines, the issues persisted. Digging deeper, we eventually identified the root cause. When the tank level transmitters were originally specified, no one had accounted for the heavy steam blanket generated inside the tanks during operation. The existing transmitters simply weren't designed for those conditions. Omni, along with a reliable LIT (level indicating transmitter) manufacturer, recommended a GWR (guided wave radar) level transmitter, a technology capable of performing reliably in heavy steam environments.



The manufacturer provided two units on loan, which were installed on a pair of tanks, calibrated, and trend-logged over a three-week period. The results were exactly what we had hoped for. The facility moved forward with purchasing twelve new level transmitters to replace the faulty instruments across all tanks. Omni also recalibrated all load cells and the three temperature transmitters on each tank. With every instrument properly specified, installed, and calibrated, the process engineer was able to deliver on the client's goals of smoother operations, consistent product batches, and improved overall process efficiency.

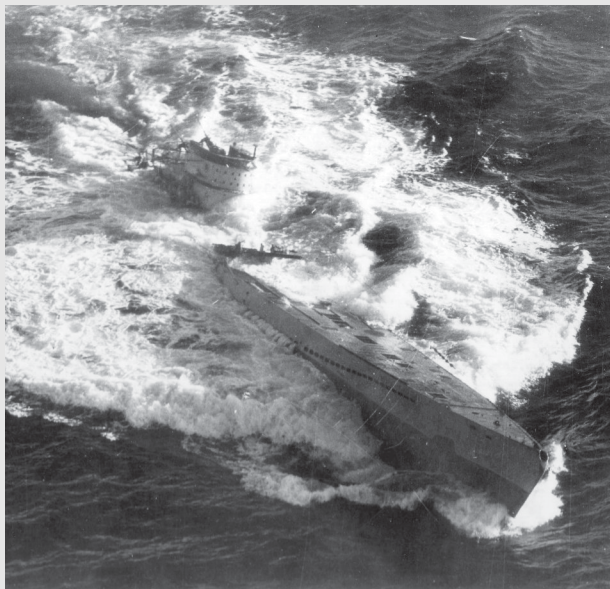


How One Instrument Sank 43 Submarines and Changed the Course of WWII

Finding a submarine in the open ocean is, by most accounts, nearly impossible. Allied commanders in the early years of World War II knew this intimately. By 1942, U-boats were sinking Allied ships faster than they could be replaced, and the convoys carrying food, fuel, and weapons across the North Atlantic were hemorrhaging. Something had to change, and it did, not through brute military force, but through an instrument small enough to hold in two hands.

The Problem With Radar: Allied aircraft had been using radar to hunt submarines for years, but the Germans had cracked the code. U-boats were equipped with receivers called Metox that could detect Allied radar transmissions from up to 50 kilometers away, giving crews plenty of time to dive and disappear. The existing systems operated on wavelengths measured in meters, a frequency the German receivers were specifically designed to intercept. Every time an Allied plane powered up its radar, it was essentially announcing itself. The solution wasn't to fly quieter. It was to change the frequency entirely.

A Copper Cylinder the Size of a Fist: In the early 1940s, physicists John Randall and Harry Boot at the University of Birmingham developed a device that would quietly rewrite the rules of electronic warfare. The cavity magnetron, a copper cylinder roughly the size of a large fist, could generate microwave radiation at unprecedented power levels on a wavelength of just 10 centimeters. That shift from meters to centimeters was everything. It produced sharper contacts, required entirely different hardware, and was completely invisible to the Metox receivers the Germans relied on.



To disguise the revolution, the new radar system was given a deliberately underwhelming name: ASV Mark 3. The designation implied a routine upgrade, nothing worth noting. In reality, it was a different instrument entirely. Standing orders prohibited it from falling into enemy hands under any circumstances, and crews were instructed to destroy the equipment if capture was imminent.

Hunting in the Dark: When ASV Mark 3 entered operational use, the effect was immediate. In good conditions, it could detect a surfaced U-boat from 12 to 15 kilometers away, in complete darkness, through weather, without warning. In May 1943 alone, Admiral Dönitz lost 43 submarines. He had no choice but to withdraw his U-boat fleet from the North Atlantic, a strategic retreat that marked a turning point in the Battle of the Atlantic.

What Came After: The cavity magnetron didn't disappear when the war ended. The technology became the foundation for air traffic control, weather radar, and medical imaging equipment. And in one of the more quietly remarkable facts of the 20th century, the same principle is what heats food in microwave ovens today. A device designed to find submarines in the dark ocean, now found in nearly every kitchen.

Toolbox Talks: Small Conversations With a Big Impact

Before the workday kicks off, a lot can happen in just a few minutes, and that's exactly what makes toolbox talks so valuable at Omni.

These brief, informal safety meetings are a staple on job sites for good reason. They keep hazards top of mind, give workers a chance to speak up about concerns, and reinforce the safety procedures that protect everyone on the crew. Done consistently, they do something even more important: they build a culture where safety isn't just a rulebook requirement. It's a shared value.

At Omni, our employees are part of the conversation and they take ownership of it. That means fewer incidents, stronger teamwork, and a crew that looks out for each other, not because they have to, but because it's just how the job gets done. That's a few minutes well spent.



5 Common Control Valve Issues: Diagnostics and Solutions

Control valves are workhorses of industrial process control, and when something's off, the effects ripple through your entire system. Here are five common issues worth having on your radar.

Deadband (Hysteresis): Deadband happens when there's a lag between the control signal and the valve's actual position, often caused by backlash, excessive friction, or loose actuator connections. It can trigger oscillations in PI or PID loops and hurt system stability. Step tests or diagnostic software can identify it, and solutions range from replacing worn components to implementing deadband compensation.



Stiction (Static Friction): Stiction causes a valve to hold its position despite a changing signal, then suddenly break free and overshoot, leading to erratic flow control and process variability. Overtightened stem seals, contamination, and undersized actuators are frequent causes. Regular lubrication, seal replacement, and proper actuator sizing are the usual fixes.

Positioner Overshoot: When a positioner is tuned too aggressively or begins to fail, the valve repeatedly overshoots its target, causing unstable control and accelerated wear. Retuning to manufacturer specs or upgrading to a smart positioner typically resolves it.

Oversized Control Valves: A valve that's too large for its application reduces rangeability, causes poor control resolution at low flow rates, and amplifies other positioning problems. If your valve rarely operates above 50-60% open, it may be oversized. Replacing it, installing a reduced trim kit, or using split-range control are all options worth considering.

Nonlinearity: Nonlinear flow characteristics can make a loop behave differently across its operating range, sluggish in one spot and unstable in another. Valve stroking tests help identify the issue, and linearization in your DCS or PLC, or adaptive tuning, can compensate.